IN THE UNITED STATES PATENT AND TRADEMARK OFFICE		
Declaration Under 37 C.F.R. 1.131		Atty. Docket No. **CROSS1560**

Applicants Steven A. Justiss	
Application Number 10/636,042	Date Filed 08/07/2003
Title **System and Method for Maintaining and Reporting a Log of Multi-Threaded Backups**	
Group Art Unit 2188	Examiner **Hein, Gregory**
Confirmation Number: **9977**	

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Certificate of Mailing Under 37 C.F.R. §1.10

I hereby certify that this correspondence is being deposited with the United States Postal Service as Express Mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22312-1450 on January _____, 2006.

_____
Signature

_____
Printed Name

1.   I, Steve Justiss, an employee of Crossroads Systems, Inc., am an original joint inventor of the invention described and claimed in the above-referenced patent application.

2.   At least as early as July 12, 2002, Robert Simms and I conceived the invention of the present application. A copy of an invention disclosure form evidencing conception at least as early as July 12, 2002 is attached hereto as Exhibit A.

3.   In a letter dated February 21, 2003, Mark Berrier of Gray Cary sent me a letter including a draft application describing the invention of the above-referenced application.

4.   The application was filed on August 7, 2003.

I, Steven Justiss, aver that all statements made of my own knowledge are true and all statements made on information and belief are believed to be true.

Steven Justiss
January 17, 2006

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INVENTION DISCLOSURE FORM

PART ONE

I. Title

Method for Maintaining and Reporting a Log of Multi-Threaded Backups

II. Application

This invention applies to implementations of multi-threaded backup applications, including those that use the NCITS SCSI-2 Extended Copy command.

This invention applies to all microprocessor-based controllers that implement multi-threaded backups, including those that implement the NCITS SCSI-2 Extended Copy command

The invention applies to computer network backup technologies.

This invention applies to all forms of backup media (for example tape, or optical media).

III. Field of the Invention

The field of this invention is computer software.

IV. Background

Computer software data backup applications may initiate multiple backup threads that store data from different sources onto one backup medium (such as a tape, or optical disk). These backup applications may operate in a standalone configuration (storage devices directly attached to the host computer), or in a networked storage configuration (storage devices attached to a network, along with the host computer). The backup applications may transfer the data of backup threads directly to the storage media (such as in direct-attached, or in "lan-free" backups), or make use of "third party copy" backup strategies.

The NCITS T10 SPC-2 (SCSI Primary Commands-2) Extended Copy command provides a method for computer backup applications to delegate actual data movement to "third party devices" known as copy managers. These copy managers typically reside in mass storage related, microprocessor-based, storage network attached devices.

Copy managers move data from source devices to destination devices as designated by the backup application in "segment descriptors" which in part constitute the parameter list of the Extended Copy command. To enable

Admin Use Only:
Method for Maintaining and Reporting a
Log of Extended Copy Backup

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restoration of the data each block of real data is paired with "metadata" which contains identifying information about the real data, allowing its proper restoration from the backup medium.

When the backup medium is tape, the copy manager strives to keep a tape drive streaming (continuously moving the tape, writing data to the tape) in order to maximize performance. To keep the tape drive streaming the copy manager generally implements some form of disk data prefetch, or "read-ahead", so that the copy manager has data in buffers ready to build the next tape write command when an active tape write command completes.

The standard contemplates that a copy manager may handle some number of "concurrent" Extended Copy sessions depending on the size and number of system resources available. (The standard provides a method of reporting to the application the number of concurrent Extended Copy commands the copy manager can handle.)

An alternative means of keeping a tape drive streaming utilizes concurrent Extended Copy command-produced tape writes which are multi-threaded onto one tape (an invention described in a separate disclosure, namely "Method for Multi-threaded Extended Copy Backup to One Tape Drive"). Host applications may find it difficult to properly restore a backup medium written in this fashion.

This invention contemplates maintaining a log that records the source of write commands, and the order with which the backup medium is written. The source identification of the write command might consist of but is not limited to such identifiers as a protocol dependent Host ID, the XCopy-specification-defined List ID, a time stamp, and the size of the backup medium block written. The order with which the backup medium is written could be identified with these same Host ID and List ID numbers. Identifying the source and order with which a backup medium has been written could be utilized to properly restore archived data.

This invention further contemplates utilizing a system of vendor unique commands to perform policy based functions such as initiate a log (possibly including an application generated log identifier), retrieve a log (that is, send it from the copy manager to the host), copy of a log to a storage medium (such as append the log to the backup medium when the backup is complete), and clear a log (erase the log from copy manager memory). These log functions might be accomplished through purely vendor unique commands, or through a mix of vendor unique and Extended Copy vendor unique extensions.

V. Previous Solutions

Existing implementations do not provide a system for maintaining and/or reporting a log of write commands to storage media that were generated by one or several backup threads, such as concurrent Extended Copy commands.

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VI. Summary of the Invention

This invention conceives maintaining a log of write commands generated by one or several backup streams that address one storage device. This allows the host application that generated the multi-threaded backup streams to decipher the data with which a storage medium has been written and thereby perform a proper restoration of the archived data.

VII. Advantages

An application can utilize "multi-threading" of backup streams from multiple source disk drives onto a single tape drive as a mechanism to keep the tape drive streaming, and utilize the "backup log" to subsequently perform a restore. In addition the "backup log" might be used for diagnostic purposes, or for performance monitoring.

VIII. Disclosure Outside of Crossroads

This invention has not been disclosed outside Crossroads Systems.

IX. Inventorship

List inventors

Name(s) and signature(s) of Person(s) Preparing this Form:

Signature			
Name	Steven A. Justiss	Robert C. Sims	
Date	July 12, 2002	July 12, 2002	

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February 21, 2003

VIA HAND DELIVERY

Mr. Steven A. Justiss
Mr. Robert Sims
Crossroads Systems, Inc.
8300 North MoPac Expressway
Austin, Texas 78759

Re: U.S. Patent Application Entitled "SYSTEM AND METHOD FOR MAINTAINING AND REPORTING A LOG OF MULTI-THREADED BACKUPS"
Our Client/Docket No.: 103671.991560 (CROSS1560)

Dear Messrs. Justiss and Sims:

I enclose a copy of the above-identified application for patent, along with a redlined copy and new drawings. The application is now ready for execution and filing in the United States Patent and Trademark Office (PTO).

Please carefully review the application. If it accurately and adequately describes the invention, please execute the "Declaration and Power of Attorney" and "Assignment" documents, signing your name in blue ink, exactly as it is typewritten and dating each document. If any minor changes to the application are necessary, they should be made and such changes must be initialed and dated by you in the side margin closest to the changes, *before* signing the Declaration. If major changes are necessary, or if you have any questions, please call me. Also, the application must disclose the best mode of carrying out the invention; please let me know if it does not.

Please note that in executing the Declaration, you are acknowledging your duty to disclose material prior art to the PTO. Such prior art includes relevant patents and printed publications, information concerning public use of methods or apparatus related to your invention, and information on public use or sales of your own invention (or related methods or apparatus) made more than a year ago. Your failure to disclose such prior art may invalidate any patent issuing on the application.

Once these documents have been executed, please return the application, executed Declaration and Power of Attorney and Assignment to me in the enclosed self-addressed stamped envelope in order that we may file the application with the PTO as soon as possible.

SILICON VALLEY SAN DIEGO SAN DIEGO/GOLDEN TRIANGLE SAN FRANCISCO AUSTIN SEATTLE SACRAMENTO LA JOLLA

Gray Cary\AU\4098586.1
103671-991560

Should there be any questions concerning this matter, please feel free to contact me at (512) 457-7016.

Sincerely,

Gray Gary Ware & Freidenrich LLP

Mark L. Berrier

MLB:klc
Enclosures

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F R O M							

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PJ 1:15pm	2.24.03

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CUS... ACCT. NO.

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Application & formula

	DELIVERY CHARGE
	RETURN
	WAITING TIME
	OTHER
	TOTAL

DRIVER:		1 RECEIVED IN GOOD ORDER:

DRIVER / / TIME

Index file

From Wikipedia, the free encyclopedia.

An **Index file** is a computer file which is associated with one or more data files and allows records in the data file to be accessed by key value, rather than searching record by record; much like the index in the back of a book allows the reader to locate information in the book without having to search page by page.

See also

- Index (information technology)

Retrieved from "http://en.wikipedia.org/wiki/Index_file"

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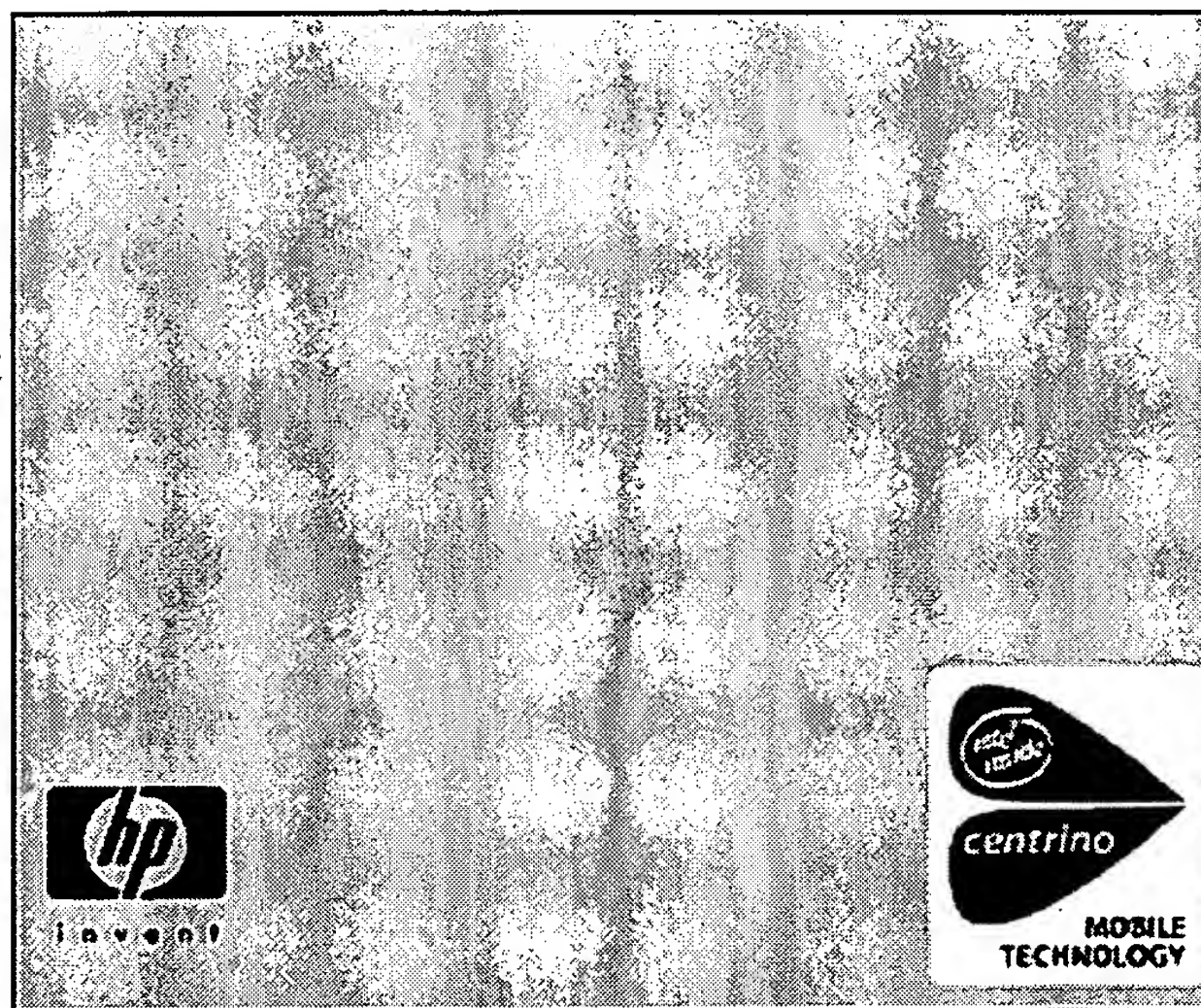
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index

Last modified: Tuesday, July 29, 2003

(n.) In database design, a list of keys (or keywords), each of which identifies a unique record. Indices make it faster to find specific records and to sort records by the index field -- that is, the field used to identify each record.

(v.) To create an index for a database, or to find records using an index.

•**E-mail this definition to a colleague**•

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